

UNM ECE 538     Fall 2021  
ADVANCED COMPUTER ARCHITECTURE

Instructor: Lei Yang

Course Webpage: [learn.unm.edu](http://learn.unm.edu)

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<b>Class Room:</b>	EECE 237	<b>Class Time:</b>	M/W 2:00-3:15pm
<b>Office Hours:</b>	M/W 1:00-2:00pm	<b>My Office:</b>	ECE 134B
<b>Contact Infor:</b>	<a href="mailto:leiyang@unm.edu">leiyang@unm.edu</a> (Text) 949-302-7908	<b>Course Web:</b>	<a href="http://learn.unm.edu">learn.unm.edu</a>

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**Course Description:** ECE 538 is a computer architecture course for graduate students. It focuses on the design of advanced computer architectures, including techniques for exploiting the design of Instructions Set Architecture (ISA), Pipelining, as well as the instruction-level, data-level, and thread-level parallelism. The features of the computer architecture and their basic design principles will be introduced, coupled with the introduction of the current trends in custom computing and emerging computing systems, such as the Application Specific Instruction Set Processor (ASIP), Digital Signal Processor (DSP), Domain-Specific Computing (DSC), Graphics Processor Units (GPUs), and heterogeneous multicore platforms. Students are required to read text books and relevant papers to learn the foundational knowledge and the design principals of computer architecture, having the insight into the trend of designing novel architectures.

There will be quizzes on the class, and homework after class. Each student will be required to submit a final project at the end of the semester, in which student can explore areas of interest within computer architecture. Besides, there are midterm exam and final exam constitute the final assessment of this course.

**Course Topics:**

- Performance Power and energy constraints
- Multiprocessors and Parallelism
- Exception and Interrupt
- Memory hierarchy and caches
- Custom and Emerging Computer Architectures

**Grading Policy:**

Homework .....	30%
Quizzes .....	10%
Midterm Exam .....	25%
Project / Final Exam .....	35%

**Textbooks:**

- John L. Hennessy & David A. Patterson, *Computer Architecture: A Quantitative Approach*, 6<sup>th</sup> Edition, The Morgan Kaufmann Series in Computer Architecture and Design, 2019.
- David A. Patterson & John L. Hennessy, *Computer Organization and Design MIPS Edition: The Hardware/-Software Interface*, 5<sup>th</sup> Edition, The Morgan Kaufmann Series in Computer Architecture and Design, 2019.

**Additional Reference Papers:**

- David Patterson & John Hennessy, *Computer Organization and Design: The Hardware/Software Interface*, 5<sup>th</sup> Edition, Morgan Kaufmann, 2014.
- Volnei Pedroni, *Circuit Design with VHDL*, The MIT Press, 2004.
- Neil Weste & David Harris, *CMOS VLSI Design: A Circuits and Systems Perspective*, 4<sup>th</sup> Edition, Addison-Wesley, 2011.
- Dominic Sweetman, *See MIPS Run: Linux*, 2<sup>nd</sup> Edition, Morgan Kaufmann, 2007.

**Course Policy:** Academic integrity will be held to the highest standards in this course. Please refer to the UNM student handbook for a complete description of academic dishonesty.